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Cardiology in practice in Europe 2011: Acute ST elevation myocardial infarction

Kristensen, S D ; Raatikainen, M J P ; Andersen, K ; et al

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Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION

European Perspectives in Cardiology



Cardiology in Practice in Europe 2011: Acute ST Elevation Myocardial Infarction



A Snapshot View of the Current Management of Acute ST Elevation Myocardial Infarction and Future Plans and Challenges in 25 European Countries

Leading European cardiologists describe the current and planned future management for acute ST elevation myocardial infarction in their hospitals and countries in 80 to 100 words.

A revolution in the management of acute ST elevation myocardial infarction (STEMI) over the past decade has transformed the emergency and cardiological services for acute STEMI patients. Underpinning this revolution has been increasing evidence demonstrating the benefits of primary percutaneous coronary intervention (PCI) and pre-PCI and post-PCI management on acute STEMI mortality and morbidity rates. Within-country and intercountry initiatives are now in place or in development throughout Europe to aid this revolution in line with national and European guidelines.

In this article, leading European cardiologists describe in 80 to 100 words what has been achieved so far in their hospitals and countries: the current management for STEMI, including acute and long-term care, rehabilitation, types of stents and drugs used, and how these will improve in the near future. The result is a fascinating glimpse of the work that has been done and is in progress throughout Europe to transform the cardiological services and outcome for patients who have acute STEMI.

Northern Europe



Denmark

(population ≈5.5 million, area ≈43,000km²)

Steen Dalby Kristensen, MD, DMSc, FESC, professor of cardiology, Department of Cardiology,

Aarhus University Hospital, Skejby, Denmark

"The 4 STEMI centres in Denmark are located in Copenhagen, Odense, Aarhus, and Aalborg, and they offer a 24-hour, 7 days a week primary PCI service for all patients

with acute STEMI. The diagnosis is usually established in the ambulance to direct the patient straight to the cath lab. Thrombolysis is not used. Standard medical therapy in the ambulance is aspirin, a P2Y₁₂ inhibitor, and unfractionated heparin. Most patients are treated with thrombus aspiration and direct stenting with a drug-eluting stent and are usually observed in the STEMI centre for 12 to 48 hours before transferral to their local hospital for rehabilitation. Patients are usually included in research projects on new devices and drugs. Reduction of patient and system delay by public campaigns and educational programmes is a focus area."

Finland

(population ≈5.5 million, area ≈338,000km²)

M. J. Pekka Raatikainen, MD, PhD, FESC, FAHA, professor of cardiology, Heart Centre Co., Tampere University Hospital, Tampere, Finland, and president of the Finnish Cardiac Society



"Primary PCI is the leading reperfusion technique in Southern Finland. In Tampere University Hospital districts practically all patients with acute STEMI are treated with primary PCI. In our centre, the door-to-balloon time is <30 minutes. The operator decides which stent (if any) is most appropriate for the patient. In the Eastern and Northern parts of Finland, thrombolysis is used widely because long travelling distances limit the availability of primary PCI. The use of long-term medication (aspirin, β -blockers, statins, etc.) is widespread, and excellent rehabilitation programmes are available for postmyocardial infarction patients. The main goals in the near future are to improve access to primary PCI in the remote areas and to boost the use of implantable cardioverter-defibrillator and cardiac resynchronisation therapies in high-risk patients."



Iceland

(population ≈320,000, area ≈103,000km²)
Karl Andersen, MD, PhD, FESC,
 professor of cardiology, Landspítalinn,
 University Hospital of Iceland,
 IS-101 Reykjavik, Iceland

"During the past 25 years, the incidence and mortality rates of STEMI have dropped by 80% in Iceland, mostly due to improvements in population risk factor levels. The University Hospital of Iceland, Landspítalinn, has a catchment area of 90% of the Icelandic population and is the only interventional centre in the country. A 24-hour PCI service was established in 2004. Currently, 94% of all STEMI patients receiving reperfusion therapy are treated with acute PCI. More than 95% of all STEMI patients receive a stent, and ≈30% receive drug-eluting stents. The median door-to-balloon time is 48 minutes, and the 30-day mortality rate after STEMI in Iceland is 6.5%. The main emphasis in STEMI treatment is to further shorten prehospital delays and optimise medical treatment according to international guidelines."



Ireland

(population ≈4.5 million, area ≈70,000km²)
David P. Foley, MD, PhD, FRCPI, FESC,
 FACC, interventional cardiologist,
 professor of cardiology, Beaumont
 Hospital, Dublin, Republic of Ireland;
 chair, Irish Cardiac Intervention Society

"In the Republic of Ireland, primary PCI for STEMI has been carried out on a variable ad hoc basis for many years. Penetration increased to ≈75% of presenters in urban areas in 2011, who were treated at 9 centres nationwide. In a typical case, transradial access has increased dramatically, glycoprotein IIb/IIIa antagonist use is highly likely, and thrombus aspiration is routine, as is drug eluting stent implantation. Intravascular ultrasound and optical coherence tomography are used with increasing frequency, depending on the operator. A strategy of culprit lesion-only PCI is usual, with deferred PCI for bystander lesions. Patients transported from district hospitals are mostly directly repatriated unless intubated or needing intra-aortic balloon pump. A national protocol for reperfusion therapy to provide access to primary PCI for all patients nationwide starts in October 2011: ≈85% of the population live within 90 minutes of a PCI centre, and those with STEMI will be ambulated directly to the nearest of 4 designated 24/7 PCI centres with full capability. Emergency medical technicians obtain electrocardiograms in the ambulance, and after confirmation by the receiving cardiology team, administer aspirin, clopidogrel, and low molecular weight heparin loading doses en route. Patients with STEMI and >2 hours from a PCI centre receive a thrombolytic locally and are transferred to the closest PCI centre in case they need rescue PCI. Prospective data collection on all aspects of the programme will be assessed to ensure optimal outcomes according to international best practice. Hospital stay is 2 to 3 days for uncomplicated cases. Cardiac rehabilitation is offered to all patients."

Latvia

(population ≈2.2 million, area ≈65,000km²)
Andrejs Erglis, FESC, FACC, professor
 of cardiology and chief, Latvian
 Centre of Cardiology, Pauls Stradins
 Clinical University Hospital, Riga,
 Latvia, director, Institute of
 Cardiology, University of Latvia, and
 president of the Latvian Society of Cardiology

"Latvia supports the implementation of the Stent for Life Initiative (see <http://www.stentforlife.com/>). According to the Latvian registry of acute coronary syndromes, the reperfusion rate for STEMI patients increased from 56% in 2005 to 81% in 2010, mainly due to an increase in primary PCI from 14% in 2005 to 65% in 2010. Drug-eluting stents were used in ≈50% of patients. Adherence to dual antiplatelet therapy, glycoprotein IIb/IIIa inhibitors, low-molecular-weight heparin, and statins has dramatically improved. Consequently, the intrahospital mortality rate has decreased by 34% across the country. The challenges over the next 10 years are to further increase the use of drug-eluting stents and total reperfusion rates and to provide primary PCI for 90% to 100% of STEMI patients."



Norway

(population ≈5 million, area ≈325,000km²)
Karel Kier-Jan Kuiper, MD, PhD,
 invasive cardiologist, Department of
 Heart Disease, Haukeland University
 Hospital, N-5021 Bergen, Norway

"Primary PCI for STEMI is provided 24/7 in 7 regional PCI centres throughout Norway. At our hospital covering West Norway with an aeromedical service, primary PCI is performed for 90% of STEMI patients. Ambulance-transmitted electrocardiograms are evaluated for STEMI at the nearest hospital, and dual antiplatelet therapy is started before transport to a PCI centre. Thrombus aspiration and second-generation drug-eluting stents are increasingly used. For patients with a transfer time >90 to 120 minutes, thrombolysis is administered locally, followed by early angiography and ischaemia-driven revascularisation. Care after discharge comprises dual antiplatelet therapy, statins, β-blocker, and an offer for rehabilitation. Improvements will focus on reducing 'time to treatment' for patients who have a long transfer time to a PCI centre."



United Kingdom

(England, population ≈51.5 million,
 area ≈130,000km²; Scotland, population
 ≈5 million, area ≈79,000km²; Northern
 Ireland, population ≈2 million, area
 ≈14,000km²; Wales, population ≈3 million,
 area ≈21,000km²)

Keith A. A. Fox, FRCP, FESC, FMedSci, Duke of Edinburgh
 and British Heart Foundation Professor of Cardiology,
 University of Edinburgh, Edinburgh, Scotland, and
 president of the British Cardiovascular Society



"The past decade has seen a transformation in the management of STEMI in the United Kingdom. From a country where thrombolytic treatment was the standard of care, the development of integrated networks of prehospital care for acute STEMI and the implementation of primary PCI as the dominant treatment has revolutionised management and outcomes. Telemetry of the electrocardiogram to the cardiac centre is increasingly employed, and bypassing of hospitals without primary PCI facilities has expedited treatment. Now, 88% of patients receive primary PCI within 90 minutes of hospital presentation, according to the Myocardial Ischaemia National Audit Project Public Report 2010, and both 30-day and mortality rates for all patients (median age 74 years) fell from 12.35% in 2003 to 8.4% in 2010, with corresponding declines in 6-month mortality rates. However, there remains scope for further improvement, including the challenge of late presentation in older and more frail patients."



Sarah C. Clarke, MD, FRCP, FESC, FACC, consultant cardiologist and clinical director for cardiac services, Papworth Hospital NHS Foundation Trust, Papworth Everard, Cambridge, England, and vice president of education and research for the British Cardiovascular Society

"The implementation of primary PCI for patients with STEMI increased access to primary PCI from 27% of the population in 2008 to 88% by February 2011 in the United Kingdom. Led by Sir Roger Boyle, National Director for Heart Disease and Stroke, in collaboration with the Cardiac Networks, pathways were adapted to different regions. National and European guidelines are used with regard to intervention and the use of drug-eluting stents. All patients are offered cardiac rehabilitation. It is envisaged that primary PCI will be available to 100% of eligible STEMI patients by December 2011."

Western and Eastern Europe



Belgium
(population ≈11 million, area ≈31,000km²)
Peter R. Sinnaeve, MD, PhD, FESC, professor of cardiovascular medicine, University Hospitals Leuven – Campus Gasthuisberg, Leuven, Belgium

"STEMI patients in Belgium are never remote from expert STEMI care, though a STEMI survey in 2005 revealed differences in treatment practices and outcomes between hospitals. A compulsory national STEMI registry therefore focused on networking. The uptake of primary PCI as the preferred choice of reperfusion strategy in non-cathlab centres and corresponding favourable mortality rates illustrate that networking is necessary in a densely populated country with abundant PCI-capable hospitals. Efforts are now focused on minimising delays at all levels, as well as on clinical and basic research."

Czech Republic

(population ≈10.5 million, area ≈79,000km²)
Petr Widimsky, MD, DrSc, FESC, professor of cardiology, head of the Cardiocentre, University Hospital Kralovske Vinohrady, Prague, Czech Republic, and president of the Czech Society of Cardiology, 2011 to 2015



"My hospital has used primary PCI for STEMI since 1993. Thrombolysis was abandoned in our hospital in 1995. The situation evolved similarly in the entire country over the next 7 years. Thrombolysis is rarely (<1%) used. Twenty-two primary PCI centres cover our 10.5 million population, with each centre performing 200 to 450 primary PCIs for STEMI each year. STEMI management in the acute phase includes prehospital electrocardiographic diagnosis and antithrombotic medication (usually aspirin, clopidogrel, and heparin) and direct transport to the nearest tertiary primary PCI centre for emergency coronary angiography followed by primary PCI. Uncomplicated patients are discharged after ≈3 to 4 days. Bare metal stents have been used most often, but this is changing with the introduction of new-generation drug-eluting stents. Long-term care includes preventive measures, rehabilitation (outpatient or in specialised rehabilitation centres), and medication (aspirin, clopidogrel, β-blockers, statins, angiotensin-converting enzyme inhibitors). Improvements in the near future will include the wider use of new-generation drug-eluting stents and the replacement of clopidogrel by more potent antiplatelet agents (ie, prasugrel or ticagrelor)."

Germany

(population ≈81 million, area ≈360,000km²)
Thomas Münzel, MD, professor and chief of cardiology, Johannes Gutenberg University, Mainz, Germany



"The prognosis for STEMI has considerably improved in Germany over the past 20 years, primarily due to the network of cath labs allowing rapid access to primary PCI. We put much emphasis on decreasing the time delay to reperfusion. Most delay is caused by the patients themselves, so in Mainz, we have started awareness campaigns emphasising what patients with chest pain should do. We also perform a structured diagnosis, risk stratification, and treatment of all patients with an acute coronary syndrome in chest pain units. A network of certified chest pain units is being established throughout Germany and so far 130 have been certified within a couple of years by the German Cardiac Society."

Hungary

(population ≈10 million, area ≈93,000km²)
Béla Merkely, PhD, DSc, FESC, FACC, director and chair, Heart Centre, Semmelweis University, Budapest, Hungary, and president of the Hungarian Society of Cardiology



"Primary care for acute STEMI patients is provided by 17 regional interventional cardiac centres in Hungary. A countrywide network covers the primary cardiac care for almost the whole area of the ≈ 10 million citizens. The number of PCIs for acute coronary syndrome is increasing. In 2010, >9000 were performed, which is >50% of the total number of all PCIs. The annual mortality of acute myocardial infarction decreased from 15,000 in 1993 to 7500 in 2010. Today, $\approx 66\%$ of hospitalised acute STEMI and non-STEMI patients are treated with PCI, so Hungary ranks 8th in Europe for PCI intervention.¹ The rate of thrombolytic therapy for STEMI patients has recently decreased to <1%."

1. Widimsky P, Wijns W, Fajadet J, de Belder M, Knot J, Aaberge L, Andrikopoulos G, Baz JA, Betriu A, Claeys M, Danchin N, Djambazov S, Erne P, Hartikainen J, Huber K, Kala P, Klineva M, Kristensen SD, Ludman P, Ferre JM, Merkely B, Milicic D, Morais J, Noc M, Opolski G, Ostojic M, Radovanovic D, De Servi S, Stenestrand U, Studencan M, Tubaro M, Vasiljevic Z, Weidinger F, Witkowski A, Zeymer U, European Association for Percutaneous Cardiovascular Interventions. Reperfusion therapy for ST elevation acute myocardial infarction in Europe: description of the current situation in 30 countries. *Eur Heart J*. 2010;31:943–957.



The Netherlands

(population ≈ 17 million, area $\approx 34,000\text{km}^2$)

Jan J. Piek, MD, PhD, FESC, FACC, FAHA,
professor of clinical cardiology and director, Heart Centre, Academic Medical Centre, Amsterdam, the Netherlands

"Completion of the randomised Zwolle trial almost 20 years ago, showing the superiority of primary PCI in the treatment of acute myocardial infarction,¹ led to a gradual acceptance in other Dutch regions to use primary PCI as the first line of treatment. Now almost all patients with acute myocardial infarction are treated with primary PCI. The well-equipped ambulance system, short call-to-needle times, and high-volume centres have contributed to its success, resulting in a gradual decline in the mortality rate, which is among the lowest in the world. This achievement has not led to a laidback attitude, but has rather stimulated Dutch interventionalists to conduct numerous randomised trials to evaluate adjuvant therapy in primary PCI varying from thrombosuction devices, glucose metabolism modulation, drug-eluting stents, and IIb/IIIa receptor blockers to cell therapy. Therefore, if you are in the unfortunate situation to experience your first acute myocardial infarction, the Netherlands is a good place to be."

1. Zijlstra F, de Boer MJ, Hoorntje JC, Reijnders S, Reiber JH, Suryapranata H. A comparison of immediate coronary angioplasty with intravenous streptokinase in acute myocardial infarction. *N Engl J Med*. 1993;328:680–684.



Poland

(population ≈ 38 million, area $\approx 313,000\text{km}^2$)

Michal Tendera, MD, FESC, FACC,
professor of medicine, Medical University of Silesia, Katowice, Poland

In Poland, as a result of reimbursement initiatives, >100 catheterisation labs are open at all times to perform PCI in patients with acute coronary syndrome, so most places in Poland are 50 to 100 km from a catheterisation lab. Most patients with acute STEMI therefore receive primary PCI, and thrombolytic treatment of

the STEMI has become virtually obsolete. The number of cardiologists adequately trained in interventional medicine is, however, limited, and some patients with STEMI are not taken to a primary PCI hospital. Now that Europe has become a limitless travel zone, Poland can also offer primary PCI to patients living in neighbouring countries close to its primary PCI centres.

Slovakia

(population ≈ 5.5 million, area $\approx 49,000\text{km}^2$)

Martin Studencan, MD, PhD, FESC,
ass. professor of medicine/cardiology,
in charge of Slovak registry of Acute
Coronary Syndromes, Eastern
Slovakia Institute of Cardiovascular
Diseases, Kosice, Slovakia



"Over the past few years, initiatives have been aimed at educating healthcare professionals and the population. Changes in clinical practice were analysed using data from the Slovak Registry of Acute Coronary Syndromes. In 2011, the proportion of patients treated by primary reperfusion increased to 70%, and the proportion of primary PCI-treated patients could reach 58%. In-hospital mortality rate decreased from 12.1% in 1998 to 7.45% in 2008. The weakest point in Slovakia is an extreme time loss incurred by patients themselves: the 'symptoms to electrocardiogram' interval was 144 minutes in 2008. Educating patients is the main focus for the next few years."

Switzerland

(population ≈ 8 million, area $\approx 41,000\text{km}^2$)

Dragana Radovanovic, MD, head,
AMIS Plus Data Centre, Institute of
Social and Preventive Medicine, Uni-
versity of Zurich, Zurich, Switzerland



"Since 1997, AMIS (Acute Myocardial Infarction in Switzerland) Plus has documented the diagnostic and therapeutic measures for acute myocardial infarction, with most hospitals participating. STEMI management is within the guideline-recommended timeframe (>80% undergo PCI, >75% within <90 minutes), 25% received bare metal stents, 70% received drug-eluting stents, $\approx 90\%$ received the recommended immediate and discharge drugs, and $\approx 54\%$ attended in- or outpatient rehabilitation. Efforts continue to maintain this high-quality management and to further shorten delays using prehospital diagnostics and immediate transportation of STEMI patients to a PCI centre."

Southern Europe

Bosnia and Herzegovina

(population ≈ 4 million, area $\approx 51,000\text{km}^2$)

Aleksandar M. Lazarevic, MD, PhD,
FESC, associate professor of medicine/
cardiology, University of Banja Luka
Medical School, Banja Luka, Republic
of Srpska, Bosnia and Herzegovina



“Bosnia and Herzegovina consists of the Republic of Srpska and the Federation of Bosnia and Herzegovina. The first and only cath lab in the Republic of Srpska was established in June 2007. In 2009, 4% of all patients with STEMI were treated by primary PCI and 28% of patients received thrombolytic therapy; $\approx 68\%$ of patients treated in hospitals did not receive either thrombolytic therapy or primary PCI. A major reason for this was late presentation. In 2009, we organised prehospital thrombolytic therapy with reteplase in 40 emergency departments. In 2010, 9% of patients were treated by primary PCI. In the Federation of Bosnia and Herzegovina, 4 hospitals have catheterisation labs, and 9% of patients were treated by primary PCI.”



Croatia

(population ≈ 4.3 million, area $\approx 57,000\text{km}^2$)

Željko Reiner, MD, PhD, FRCP(Lond), FESC, FACC, professor of internal medicine and director, University Hospital Centre Zagreb Salata 2, 10 000 Zagreb, Croatia

“In Croatia, a network was established a number of years ago based on geographical areas and fast transport to the nearest hospital. A helicopter service is used for transportation from the islands and more remote areas, and ambulances, mostly physician-manned, are used in other parts of the country. In the hospitals in this network, primary PCI is performed in STEMI patients. Bare metal stents are usually used rather than drug eluting stents ($\approx 5\%$ of patients) for financial reasons. Coronary artery bypass grafting is performed if needed. Aspiration thrombectomy is used routinely in my hospital.

“A relatively high percentage of post-STEMI patients receive rehabilitation in specialised centres. European Society of Cardiology guidelines are strictly followed for drug therapy. Improvements are always possible, particularly in further development of the organisation, especially to shorten the door-to-balloon time.



Cyprus

(population $\approx 803,000$, area $\approx 9,000\text{km}^2$)

Panayiotis Avraamides, FRCP, FESC, FSCAI, FACC, director, Department of Cardiology, Limassol General Hospital, Limassol, Cyprus, and president of the Cyprus Society of Cardiology and the Cyprus Working Group on Interventional Cardiology

“More than 90% of acute STEMI patients are treated in the 5 state general hospitals, 2 of which have cath labs. The rest are treated in private medical centres, 3 of which have cath labs. The small distances and public awareness of the symptoms of myocardial infarction translate into rapid therapy. When the cath labs are open, patients are treated by primary PCI, but at nights and on weekends and in hospitals without invasive facilities, thrombolysis is the mainstay of treatment. The low rates of primary PCI are due to a lack of trained interventionalists. We are addressing this with intensive training programmes to provide enough

trained personnel for a 24-hour 7 days a week primary PCI programme by 2012. Whether this happens, however, depends on whether the government will provide funding in this time of public cost cutting.

“Stents are used in almost 100% of primary PCIs. Until recently, mainly due to concerns about thrombosis with drug-eluting stents, the majority were bare metal stents. This has changed, and $>80\%$ of stents for primary PCI are now drug-eluting stents. All guideline drugs are in use with a few exceptions: clopidogrel is the thienopyridine in general use, and although prasugrel is available, it is not in use in the state hospitals due to its cost. Bivalirudin is not widely available. All patients are followed up by a cardiologist with guideline-based management in both state and private centres: 80% of the population is eligible for free healthcare.

“No large-scale official rehabilitation programmes have been available. We are addressing this, partly by the establishment this year of a new working group on cardiac rehabilitation to study this issue and make recommendations.”

Greece

(population ≈ 11.5 million, area $\approx 132,000\text{km}^2$)

Gerasimos Filippatos, MD, FACC, FCCP, FESC, chief of the Heart Failure Unit, Department of Cardiology, Athens University Hospital, Athens, Greece



“In Greece, with thousands of islands and only 10 primary PCI centres, the reperfusion rates for STEMI in 2005 were $\approx 65\%$. Of the patients admitted to hospitals with a cath lab, 24% had primary PCI in comparison with 1% of patients admitted to small peripheral hospitals. An unexpected finding is the relative underuse of common treatments in the peripheral hospitals. Initiation of STEMI networks in most regions, coordinated centrally by Professor John Nanas, has improved reperfusion rates and the use of primary PCI and evidence-based therapies.”

Israel

(population ≈ 8 million, area $\approx 21,000\text{km}^2$)

Morris Mosseri, MD, head of the Cardiovascular Division, Meir Medical Centre, Kfar-Sava, Israel



“At Meir Medical Centre, all patients with STEMI undergo primary PCI. Data on treatment of STEMI in Israel is provided by the 10th Israeli Biennial National Survey on Acute Coronary Syndromes of 776 patients performed in 26 hospitals between March and April 2010. Median door-to-balloon time was 68 minutes. Reperfusion was by primary PCI in 94%, thrombolysis in 4%, and urgent coronary artery bypass grafting in 1%. During primary PCI, $\approx 57\%$ of patients were treated with IIb-IIIa antagonists, $\approx 6\%$ with bivalirudin, and $\approx 46\%$ with an aspiration/protective device. Stents were implanted in 90% of patients (bare metal 78%, drug-eluting 18%, both types 3.4%). Medical treatment on discharge usually includes aspirin, clopidogrel, statin, β -blocker, and angiotensin-converting

enzyme inhibitor or angiotensin receptor blocker. The 30-day mortality and major adverse cardiovascular event rates were 4.1% and 10.4%, respectively. At Meir Medical Centre, 40% of patients have rehabilitation. The rate is 0% to 50% for other centres. The Israel Heart Society is planning a campaign to shorten the time from symptom onset to seeking help."



Italy

(population ≈61 million, area ≈301,000km²)

Raffaele De Caterina, MD, PhD,
professor of cardiology and director
of the Institute of Cardiology,
"G. d'Annunzio" University,
Chieti-Pescara, Chieti, Italy

"Acute STEMI is treated by primary PCI almost by default in my hospital and in my city (Chieti), but some areas in the province are too remote for quick transportation to our tertiary care hospital. For this reason, I feel it is important that the 'culture of thrombolysis' is not lost. In training young cardiologists, I insist that they have knowledge about the management of STEMI with tenecteplase and know how to recognise failed reperfusion that needs rescue treatment in these patients."



(Republic of) Macedonia

(population ≈2 million, area ≈26,000km²)

Borce Petrovski, MD, PhD, FESC,
FACC, interventional cardiologist and
director, Institute for Heart Diseases,
Clinical Centre, University of St. Cyril
and Methodius, Skopje, Macedonia

"Macedonia provides full government health insurance to its population of 2 million and 3 PCI centres. The furthest distance to a PCI centre is <2 hours in an ambulance. Primary PCI was started in 1995. In 2003, a national strategy for acute STEMI treatment was established. Reperfusion is carried out in 91% of patients: primary PCI in 71.5% and thrombolytic therapy in 19.5%. A printed algorithm in accordance with European Society of Cardiology treatment guidelines is distributed in every medical institution. Door-to-balloon time is 46 minutes. Primary PCI is performed for cardiogenic shock, severe coronary heart disease, haemodynamic/electrical instability, persistent ischemia, and failed thrombolytic therapy. Early physical activity and secondary prevention are also recommended in the national strategy."



Serbia

(population ≈7 million, area ≈88,000km²)

Miodrag Ostojic, MD, PhD, FACC,
FESC, FSCAI, professor of cardiology,
Division of Cardiology, Medical
School of Belgrade, Belgrade, Serbia

"Serbia is 1 of 10 countries that has far from optimal reperfusion strategies for STEMI and is included with prospective follow-up in the Stent for Life Initiative (see <http://www.stentforlife.com/>). Impressive improvements were registered in 2009, with 34.2% and

28.3% of patients treated by primary PCI and hospital thrombolysis, respectively, in 9 centres. Further progress in 2010 and 2011 has been observed. Two new centres are about to open in central and southeast Serbia. The focus is now on improving the prehospital administration of aspirin and clopidogrel and avoiding delays in transferring patients to the cath lab."

Slovenia

(population ≈2 million, area ≈20,000km²)

Marko Noc, MD, PhD, FESC,
professor of medicine, Medical School
Ljubljana, and head of the Centre for
Intensive Medicine, University
Medical Centre, Ljubljana, Slovenia



"Slovenia is well covered by highways and emergency helicopter transport. Primary PCI has been the only reperfusion method for STEMI for several years. Of 5 interventional centres, 2 provide a 24/7 service and treat the majority of STEMI patients (650 and 450 primary PCIs per year, respectively). A 'fast track' with direct transfer from the field or from a non-PCI hospital to the cath lab reduces time delays to reperfusion. Most patients are pretreated with aspirin, thienopyridine, and heparin. Manual aspiration and bare metal stents are usually used. Improving links for the fast track, reducing the proportion of late presenters, and optimising treatment of survivors of prehospital cardiac arrest are ongoing challenges."

Tunisia

(population ≈10.5 million, area ≈164,000km²)

Habib Haouala, MD, FESC, professor
of cardiology, University of Tunis, Tunis,
Tunisia, head, Cardiology Department,
Principal Military Hospital Tunis, and
past-president Tunisian Society of
Cardiology and Cardiovascular Surgery



"Only 15% of acute STEMI patients are taken by ambulance to the emergency room. Mechanical or pharmacological reperfusion is performed for 40% of patients presenting within 12 hours. Antithrombin and antiplatelet agents are widely used, except bivalirudin and fondaparinux, which are not available. Rehabilitation is underused because of the lack of centres. Programmes to improve the quality of care for acute STEMI include improving the emergency ambulance and medical services, establishing a national registry on STEMI management, creating a network between different PCI departments, and increasing the number of cardiac rehabilitation centres."

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